

Application Tool**Cross-reference to Related Applications**

This application claims priority to and the benefits of United Kingdom Provisional Patent Application GB 0221741.2, filed September 19, 2002, the disclosures of which are herein incorporated by reference in their entirety.

Field of the Invention

The present invention relates to a tool and method for applying a sheet material to a surface of a structure, in particular to a surface of a vehicle.

Background of the Invention

In the field of advertising, there exists a need to temporarily apply advertising display panels to permanent or semi-permanent structures. Such structures traditionally include buildings and billboards. More recently, advertising display panels have been applied to the sides of vehicles in order that they may be used as mobile advertising media. Such advertisements provide a highly visible display reaching potential customers across a range of geographical regions.

Large advertising panels can be difficult to handle and mount onto the surface of the structure. The panel must be securely fastened to prevent peeling, billowing and flapping. Furthermore, it is necessary for the panel to be smoothly applied without creases, air pocket and wrinkles so that the displayed image is not distorted. The dynamic nature of the advertising industry requires that the panels can be changed quickly and easily.

1 It would therefore be desirable to have equipment suited
2 to the task of mounting a panel to a vehicle surface.

3

4 **Summary of he Invention**

5 It is one object of the invention to provide a tool for
6 easing the mounting of panels to surface structures.

7

8 It is another object of the invention to provide a method
9 for mounting a panel to a surface of the structure.

10

11 Further aims and objects of the invention will become
12 apparent from a reading of the following description.

13

14 According to a first aspect of the invention, there is
15 provided a tool for applying a sheet material to a
16 surface of a structure. The tool includes a locating
17 assembly for locating the tool with respect to the
18 structure, said locating assembly including a support
19 frame and translation assembly for allowing relative
20 movement between the structure and the tool. The tool
21 also includes an applicator for applying the sheet
22 material to the surface, said applicator being supported
23 by the support frame.

24

25 The applicator may include a spindle and a central core,
26 the roll of sheet material formed around the central
27 core.

28

29 In one embodiment, the support frame includes a spar
30 oriented along a first axis, the spar being suspended
31 above the structure by the translation assembly.

32

33 Preferably, the spindle is attached to the spar in a
34 perpendicular arrangement. More preferably, the first

1 axis is oriented perpendicularly to the surface, and the
2 spindle is oriented parallel to the surface.

3

4 Two applicators may be provided, one at each opposing end
5 of the support frame.

6

7 Preferably, the spindle is rotatable with respect to the
8 support structure. More preferably, the spindle is
9 provided with a clutch mechanism such that rotation of
10 the spindle occurs at a predetermined torque.

11

12 The translation assembly may include one or more wheels.
13 The spindle may be provided with a pair of buffers,
14 positioned at either side of the roll of sheet material.

15

16 The tool may be provided with auxiliary urging assembly
17 for effecting releasable attachment of the panel to the
18 surface.

19

20 The structure may be a vehicle or a part of a vehicle.
21 The panel may be an advertising display panel.

22

23 According to a second aspect of the invention, there is
24 provided a tool for applying a sheet material to a
25 surface of a vehicle. The tool includes a locating
26 assembly for locating the tool with respect to the
27 vehicle, said locating assembly including a support frame
28 and a translation assembly for allowing relative movement
29 between the vehicle and the tool. The tool also includes
30 an applicator for applying the sheet material to the
31 surface, said applicator being supported by the support
32 frame.

33

1 According to a third aspect of the invention, there is
2 provided a method for applying a sheet material to a
3 surface of a structure. The method includes locating a
4 tool with respect to the structure, said tool comprising
5 a support frame, translation assembly, and applicator
6 supported by the support frame; and removably attaching
7 first portion of the sheet material onto the surface of
8 the structure. The method also includes translating the
9 tool with respect to the structure such that the
10 applicator moves in a direction substantially parallel to
11 the surface, thereby juxtaposing successive portions of
12 the sheet material with the surface.

13
14 According to a fourth aspect of the invention, there is
15 provided a method for applying a sheet material to a
16 surface of a vehicle. The method includes locating a
17 tool with respect to the vehicle, said tool comprising a
18 support frame, translation assembly, and an applicator
19 supported by the support frame; and removably attaching
20 first portion of the sheet material onto the surface of
21 the vehicle. The method also includes translating the
22 tool with respect to the structure such that the
23 applicator moves in a direction substantially parallel to
24 the surface, thereby juxtaposing successive portions of
25 the sheet material with the surface.

26
27 The method may comprise the additional step of forming
28 the sheet material into a roll on a central core prior to
29 the removable attachment of the first portion of sheet
30 material.

31

1 **Brief Description of the Drawings**

2 There will now be described, by way of example only,
3 various embodiments of the invention with reference to
4 the following drawings, of which:

5
6 Figure 1 shows a perspective view of a tool in
7 accordance with an embodiment of the invention;

8
9 Figure 2 shows a side view of the tool of Figure 1
10 in use;

11
12 Figure 3 shows a side view of a tool in accordance
13 with an alternative embodiment of the invention;

14
15 Figure 4 shows a perspective view of a tool in
16 accordance with a further embodiment of the
17 invention; and

18
19 Figure 5 shows a perspective view of a tool in
20 accordance with a further embodiment of the
21 invention.

22

23 **Detailed Description of the Invention**

24 Referring firstly to Figures 1 and 2, a tool 10 is shown
25 in position on a vehicle trailer 12. The tool 10
26 comprises a locating assembly having a support frame 14
27 and wheels 18, 19. Wheels 18 are mounted on a
28 cylindrical spar 16, located substantially horizontally
29 across the width of the trailer 12. Wheel 19 is mounted
30 on an auxiliary member 17, rigidly fixed to the spar 16
31 approximately perpendicularly. The wheels 18, 19 rest on
32 the upper surface of the trailer, thereby suspending the
33 support frame above the trailer and across the width of
34 the trailer.

1

2 At opposing ends of the spar 16 are mounted vertical
3 spindles 20. Each spindle is connected to a roll 22 of
4 sheet material 24.

5

6 Typically the panel has a sheet of PES (polyethersulfone)
7 fabric coated on both sides with PVC, with a matt lacquer
8 applied to the printing side. The lacquer allows the
9 panel to be printed. The sheet is UV stabilised, anti-
10 wicking and fire-retardant. The sheet is substantially
11 non-permeable in that it does not allow liquid or air to
12 readily pass through it.

13

14 The size of the sheet may vary to fit the size of the
15 side of a trailer. The typical weight is approximately
16 460g/m².

17

18 The reverse of the sheet 24 has strips of a fastener 27a
19 attached, for example by bonding with glue, ultrasonic
20 bonding, stapling or stitching. The strips are attached
21 around substantially the entire perimeter of the sheet,
22 in that there are substantially no gaps left for air or
23 fluid ingress after mounting on the truck or truck
24 trailer. Optionally, one or more fasteners may be placed
25 away from the perimeter in order to provide support for
26 the centre of the sheet.

27

28 The truck trailer 12 has corresponding fasteners 27b
29 arranged on its side surface, attached for example by
30 bonding with glue, ultrasonic bonding, stapling or
31 stitching.

32

33 The roll 22 is formed around a central core (not shown).
34 The spindle is connected to the central core via a

1 locking disc 26, which also functions to cover the end of
2 roll 22. The roll is releasably attachable from the
3 locking disc, and thus is releasably from the tool
4 itself.

5

6 The spindle is rotatable with respect to the support
7 frame, such that the entire roll may rotate about a
8 vertical axis. The rotation mechanism of the spindle
9 includes a clutch mechanism that is resistant to rotation
10 of the roll, such that rotation will only be effected
11 when a predetermined torque is applied to the roll. This
12 allows a degree of tension to be maintained in the sheet
13 material during the application process.

14

15 In use the tool is located in position on the vehicle as
16 described above. The wheels 18, 19 rest on the upper
17 surface of the vehicle, and suspend the support frame and
18 rolls 22. The Figures show the panel being applied from
19 the rear of the trailer towards the front, although the
20 application may equally be used in the reverse direction,
21 from front to rear.

22

23 The outward edge of sheet material is withdrawn from the
24 roll, just enough to align the fasteners at the trailing
25 edge of the panel with the corresponding connectors on
26 the surface of the vehicle. The fasteners are then
27 pushed into engagement. The tool is then moved with
28 respect to the trailer in a forward direction. The
29 clutch mechanism initially resists the unrolling of the
30 sheet material until sufficient tension has built up in
31 the sheet. When the tension is such that a predetermined
32 torque acts to the roll, the sheet material is allowed to
33 unroll and the tool moves along the length of the
34 trailer. As the tool moves, the sheet material is

1 juxtaposed with the surface of the vehicle, and at points
2 immediately rearward of the tool (as it moves towards the
3 front of the trailer), the fasteners 27a, 27b are pushed
4 together to attach the panel.

5
6 The tool allows the panel to be attached simply and
7 quickly to the surface of a trailer. The gradual, linear
8 attachment of the panel reduces the likelihood of forming
9 air bubbles, creases, and wrinkles, all of which may
10 distort the displayed image.

11
12 The embodiment shown in Figure 1 and 2 includes a wheel
13 19 mounted on an auxiliary member 17. This arrangement
14 allows the whole tool to be pivoted about the spar when
15 loading or unloading rolls 22. By pivoting the tool (in
16 a clockwise direction for the example shown in the
17 Figures), extra ground clearance and manoeuvrability is
18 gained. The wheel arrangement 17, 19 prevents pivoting
19 of the tool in the opposite direction.

20
21 Figures 3 and 4 show alternative embodiments of the
22 invention. In these examples, the support frame 40
23 comprises a pair of horizontal spars 16a, 16b, each
24 having a pair of wheels 18a, 18b mounted thereon. The
25 vertical spindles are mounted centrally on a linking
26 frame member 42. This arrangement makes the tool less
27 prone to pivoting about the spars 16, and thus provides
28 additional stability to the tool.

29
30 The embodiment of Figure 3 is provided with further
31 support by way of the wheeled base assembly 32, which
32 rests on the ground surface during use and storage of the
33 tool. The assembly includes a height adjustable pillar
34 34, so that the weight of the tool can be distributed

1 between the upper surface of the trailer and the wheeled
2 base assembly.

3
4 An alternative embodiment of a tool 48 is shown in Figure
5 5. This example includes a support frame arrangement
6 that differs from the above-described embodiments, and
7 has only a single applicator. The support frame 50
8 includes a locating assembly 52 having an upper frame
9 element 52a running parallel to the vehicle surface.
10 Mounted to the support frame 50 are wheels 53, which rest
11 on the upper surface of the trailer 12 during use.

12
13 The tool 48 is also includes a vertical support element
14 51 running adjacent to the roll 22 of sheet material 24.
15 At the lower end of the vertical support element is a
16 lower frame element 55, having mounted thereto an
17 additional wheel 56. The lower frame element 55 is
18 attached to the vertical support element 51 via a
19 lockable pivot 54. In use, the tool 48 is located by
20 placing the wheel(s) 53 on the upper surface of the
21 trailer 12 while the lower frame element 55 is aligned
22 approximately parallel to the vertical support element
23 51. Subsequently, the wheel 56 is locked into place on
24 the underside of the vehicle trailer by rotating the
25 lower frame element 55 about the pivot 54. The tool 48
26 is thus "clamped" onto the trailer 12.

27
28 The roll 22 is supported on its underside by bracket 58.
29 To assist in loading and unloading of a roll 22, the
30 bracket 58 is pivotally mounted to the vertical support
31 element 51. The roll 22 is locked to an upper spindle as
32 before, by means of a locking disc (not shown).
33 Thereafter, the bracket 58 is lifted such that it abuts

1 the lower end of the roll 22. A similar locking disc may
2 be utilised.

3

4 It will be evident that various modifications may be made
5 to the above-described embodiments within the scope of
6 the invention. For example, the twin-roll arrangement of
7 Figures 1 to 4 may utilise a vertical support element and
8 lower bracket as described with reference to Figure 5.

9

10 In addition, one or more rollers may be provided on the
11 tool for urging the fastening materials together. Such
12 rollers may extend rearward (with respect to the
13 direction of movement of the tool) in alignment with the
14 fastening material 27a, 27b. By biasing the rollers
15 against the sheet material, the fasteners may be forced
16 into engagement, removing the need to manually attach the
17 panel.

18

19 It is envisaged that the tool may be used to remove a
20 panel from a vehicle and coil the panel into a roll.

21

22 Although the foregoing description relates primarily to
23 the application of panels to surfaces on vehicles, the
24 tool may equally be used to apply panels to surfaces of
25 other structures, such as buildings or billboards.

26

27 Further modifications and improvements may be added
28 without departing from the scope of the invention herein
29 described.